

PRODUCING KNOWLEDGE THAT IS GENERALIZABLE AND USABLE FOR PRACTICE: A REVIEW

CHRIS ARGYRIS
Harvard University

Clive Emmanuel & David Otley, *Accounting for Management Control* (Wokingham, U.K.: Van Nostrand, Reinhold, 1980).
Norman B. Macintosh, *Social Software of Accounting and Information Systems* (Chichester: John Wiley, 1985).
Kenneth A. Merchant, *Control in Business Organizations* (Cambridge: Ballinger, 1985).

If these three books are representative of current thinking and research about the behavioral aspects of accounting, then the field is alive and well.

The very success of these books helps to raise several questions about the future of research and teaching that I should like to explore. I will review the Macintosh and Emmanuel & Otley books first, and then the Merchant book. The reason for the separation will, I hope, become apparent.

Macintosh suggests that designing and administering accounting and information systems requires dealing with the "social software" as well as the technical aspects of such systems. The purpose of the book is to bring most of the important research knowledge that has been produced on this subject to the attention of students, managers, and academics. The author integrates the findings wherever possible, but he warns the readers that they will not find one general all-encompassing theory.

The author produces two intriguing models. A first one depicts the influence of technology on the design and implementation of information systems. The second is a model of management control systems. The combined models describe

the mechanisms by which a systematic linking occurs between work-unit technology and accounting and information systems.

The book is a delight in its careful description of problems, its analysis of how research can be used to understand the problems, and its methodically stated set of conclusions and advice to the practitioner. The analysis made by Macintosh of the strengths, gaps, and inconsistencies of the existing research plus the models that he presents should serve as a basis for further research by scholars.

The Emmanuel & Otley book is a bit less comprehensive in the review and analysis of the literature. The authors have selected some of the best research literature on the problems of managing or controlling programmed and nonprogrammed decisions. They provide a thoughtful review of the concepts, how they may be used, as well as potential limits.

They distinguish between the control of programmed and nonprogrammed decisions because they believe that the technologies utilized by each produce different human problems. In the case of the programmed decisions, the predictive model is explicit and available to managers and their subordinates. Hence, implementa-

tion is relatively straightforward. The predictive models for nonprogrammed decisions are largely implicit in the minds of individuals. The authors conclude that these models are better developed by people at lower levels in the organization because they are the ones to implement what is desired.

Emmanuel & Otley embed their entire discussion in the larger context of designing and managing organizations. They provide the reader with an array of ideas on organizational design and human motivation. Macintosh also embeds his perspective in the organizational context. However, his review of the organizational literature is more focused because he is intrigued with the question, how do the structural uncertainties of environment, goals and technologies influence the accounting and information systems?

The authors of these two books frame their arguments and develop their models by relying on rigorous research. By rigor, I mean simply that research and inquiry that strive to the scrupulously accurate, precise, strict, and that does not knowingly permit evasion or escape of poor reasoning or inquiry. Scholars believe that the technology for rigorous research is the best available means to ensure that researchers are not kidding themselves or others. Researchers seek the truth. They realize, however, that all they can do is approximate it, point out the gaps, and work hard to close them in future work. They strive to be realistic and humble about the applicability of the research, cautioning the reader not to make too hasty extrapolations.

The difficulty with this position is that the technology of rigorous research may, in addition to seeking the truth, at the same time, inhibit finding it, especially if the purpose of the knowledge produced is not only to understand and explain but to be the basis for action. And this is the central task of the practitioner to whom all three books are addressed in varying degrees.

Some scholars separate understanding and action. But this raises the question of what is the nature of understanding and explanation that cannot be used to take action? Imagine a relatively complete explanation of cancer from

which one cannot derive specific actions on how to cure it.

Some readers may point out that as research becomes more complete, the knowledge will become more applicable. Unfortunately, this perspective receives little support in several reviews of research related to "software" issues. Research results apparently are rarely additive. And when they are, it is usually to provide a more complete understanding of reality and not to provide usable advice on how to act to deal with the online activities of everyday life that a manager faces (Argyris, 1980).

For example, Macintosh reviews the research on expert judgement processes. He then discusses how the "Brunswick lens" model can be used to understand expert clinical judgement and how the model was the source of interesting research on auditing and investment security evaluation. He concludes that the judgement of experts is remarkably unreliable, especially for more complex tasks; however individual experts are consistent in their judgement over time.

Macintosh then advises that information professionals should take on a more proactive role in interpreting information during the decision-making processes being very careful not to usurp the decision maker. The advice stops there. But, in my experience, that is precisely the point where many professionals get in trouble. They may "interpret" information in ways that line managers see as "telling" them what to do and the line managers are unaware of the unintended impact. Or, they interpret information in such a careful manner than line managers become frustrated. Often the line managers try to hide their disappointment and often they fail to do so but think they have succeeded. Both books advise a more proactive role, but their advice is related to designing information systems and less the online behavior required to be more proactive in their relationships with line managers.

But even the understanding and explanations available are self-limiting. It is unlikely, I believe, that practitioners can keep in mind all the nuances that Macintosh or Emmanuel & Otley

describe. Indeed, it is unlikely that the authors themselves can store and retrieve all the knowledge in their respective books in an online manner. The user would have to carry around the Macintosh or the Emmanuel & Otley books as external memories.

Under what conditions is that feasible? I suggest primarily in using the knowledge to design information systems. The three authors, I believe, would maintain that an important step to using information systems is to have the right ones. Each book outlines the information systems that are best for programmed and nonprogrammed decisions as well as those with high or low degrees of uncertainty. But neither has very much to say that is rigorous about the problems of online usability.

Nor, at times, is the description as adequate as the argument requires if informing action is as important as producing understanding. For example, we learn that the McNamara type of budgeting system may have been valid for the automobile industry while less valid for jungle warfare (more uncertainty and more nonprogrammable decisions). One result is that field commanders covered themselves by such acts as producing fictitious information.

It would have been helpful to include a more thorough description of the commanders' behavior that led to the distortions as well as what were the actual information systems in the automobile companies and in the combat zones. Such a description would not only provide more insight into the actions taken and why; it would also show, I believe, that people produced much fictitious information in the automobile plants. The difference was that they could cover it up and cover up the cover-up.

Or, if it is true that individuals vary in cognitive styles, and that cognitive styles are so important that the design of information systems should take these styles into account, and if cognitive styles show variance, then how do we explain the consistency of distorting information across so many different managers and under conditions that are as different as an automobile plant and the battlefield. One possibility is that when human beings *implement* their actions,

the differences in cognitive styles wash out.

If, as both books recommend, managers use different information systems for different tasks (e.g. tasks that are easily programmable and those that are not), then what action skills will manager's require to manage others with different information systems?

In summary, the first two books are rigorous about understanding and explaining information systems that will lead to helpful advice about designing information systems. They are less helpful in deriving actions to be taken by managers. More research is needed that will provide understanding of how to implement the different designs that are recommended under online conditions. We should not be surprised if such research may feed back to alter our understanding of design and information systems.

Merchant also knows the research literature. However, he uses it in a somewhat different manner. Whereas the first three authors use the research literature as figure and practical problems as ground, Merchant reverses what is figure and what is ground. He shows more concern for the line manager.

In order to examine this argument more carefully, I should like to present a framework of the aspirations that scholars and practitioners hold in carrying out their respective activities. Such a framework is outlined in Fig. 1.

Embedded in these different frames are important differences about what each actor seeks. The researchers seek neutrality, completeness, and precision. The practitioners take normative stances, appropriate incompleteness, and fuzziness that is designed to be appropriately precise.

These are nontrivial differences. Whenever researchers and practitioners have serious disagreements, they typically deal with each other by acting with integrity. Integrity means that the players stick to their principles and values. In doing so, researchers focus on the left-hand column and practitioners on the right-hand column. The result is often a polarization which, in turn, results in each side attributing nasty motives to the other as well as undermining what each could teach the other.

What actions could researchers take to reduce

Scholars aspire to	Practitioners aspire to
(1) Understand the world as it is	(1) Create the world as they would like it to be
(2) Adopt a neutral stance as to what the world should look like	(2) Adopt a normative stance as to what the world should look like
(3) Test ideas until they are certain they have ruled out competing explanations and then use the ideas	(3) Test ideas while they are using them. Keep an eye out for competing explanations, and decide whether to deal with them, ignore them, or squash them.
(4) Conduct research with no self-fulfilling prophecies	(4) Produce self-fulfilling prophecies
(5) Separate discovery from implementation	(5) Produce discovery through reflection on implementation
(6) Place faith in additivity of knowledge to move from discovery to implementation	(6) Doubt that scientific knowledge is additive and even if it were, it is difficult to store in the human mind and retrieve it when it is necessary to act.

Fig. 1. A comparison of the aspirations of scholars and practitioners.

the polarization? First, researchers might reflect on their own actions when they are acting as parents, administrators of departments, participants in faculty meetings, etc. They will conclude, I suggest, that their actions are more consistent with the right-hand column. I would also suggest that when their actions are more consistent with the left-hand column, they are probably producing knowledge that leads to the "thoughtful" inaction for which scholars are famous.

I am reminded of an experience with Mr James Rouse, the famous city planner and builder. He invited half a dozen scholars to advise him on Columbia, a city still in the design stage. After two days of intensive listening, he concluded that the most important information he gained from social scientists was the dangers of building. He told me, "If I took social scientists seriously, I would never build Columbia." To his credit, he knew how to take them seriously while not immobilizing himself with the doubts they communicated, carefully derived from research.

Second, researchers could accept the right-hand column as an important focus for their rigorous research. Researchers, for example, could study problems of creating worlds (not only designing them); identifying and taking normative stances; producing generalizations that actors can use to bring about intended con-

sequences and, at the same time, as tests of theories; producing self-fulfilling processes while learning how to interrupt them when they are counterproductive; and discovering generalization by online reflection while implementing designs.

Researchers would not only describe the right-hand column, they would ask why is it used so often. What is so compelling about these activities that most people use them in everyday life? What kinds of generalizations and rules must they have in their heads in order to use them?

Similar questions could be asked about accounting information systems. The left-hand column dominates the research on design; the right-hand column on the use or implementation. If we are to make our knowledge usable and valid for action, then somehow we must study rigorously the bridging of these two perspectives.

The task will be difficult because in order to conduct rigorous experimental and correlational research, I suggest scholars will use similar theories of unilateral control and power as embedded in most pyramidal organizations (Argyris, 1980). Thus, although Macintosh, and Emmanuel & Otley suggest different information systems for different bureaucratic vs organic systems, the research methods used by the scholars they quote are consistent with the theories of ac-

tion embedded in bureaucratic organizations. The result is propositions that suggest different designs of information for bureaucratic and organic organization that are "blind" to the possibility that when the different designs are implemented, the differences will wash out or that rigid bureaucratic organization may profit from information systems more akin to those seen as needed by an organic organization because they may help to unfreeze the bureaucratic rigidity.

Merchant appears to me to have a theory about educating managers to use control in business organizations which is more compatible with the right-hand column. His book is closer to taking action; action that produces self-fulfilling prophecies; action that is guided by propositions that are designedly sloppy yet usable.

Merchant begins with a set of questions that managers would find more relevant. Why do managers have to implement controls; what is a good control; how to choose from among alternative controls; how to tighten or loosen controls; and what can go wrong when controlling.

Unfortunately, there is less rigorous research designed to answer them. Merchant attempts to fill in the void by using testimony from executives and stories embedded in case studies. The difficulty with this approach is that he does not inform the reader of the gaps and holes in his position (as do the other authors of their position). The practitioners are not offered a method to reflect on their practice; nor how to use their actions to test the theory that is embedded in the book. Yet it would be valuable for the practitioners to continue to test and reformulate the theory whenever it is necessary. It would also be helpful to the scholars to learn of the changes that were necessary.

For example, Merchant emphasizes more than the other authors the games people play with control systems. Yet after having described them, he says very little about how to engage with them in order to reduce them. Indeed, he comes closer to the stance of the first two books which is to design information systems and actions that bypass the games. If this advice is used, it will reinforce the games because bypassing them requires covering up the bypass which, in

turn, covers up the games and permits them to flourish.

There are two other problems that are embedded in the assumption that research should be used to reduce ignorance. First, it is not possible to know everything one needs to know ahead of time. Indeed, the more people believe that they know ahead of time what they need to know, the more likely they are to become closed or blind to new information, especially information that is contradictory to their biases. This, in turn, may lead others to conclude that they are uninfluenceable. Both stances may activate defensive routines and cover up that they are covering up. The end result is more distorted information.

The second problem is that effective action may require, at times, designed ignorance. The task is to fill the gap created either by not being able to know everything ahead of time or by having designed one's ignorance. Such online gap filling requires a theory and a method of gap filling that would be taught to all practitioners.

Any theory of gap filling would include the actor as a gap filler. How do managers organize and enact reality? What kinds of maps do practitioners need in order to take action? For example, it appears that features of "action maps" are different from features of maps of understanding that the first two books utilize. Action maps describe how to get from here to there; focus on self-sealing processes, and result in generalizations that are consistent with producing the conditions on the right-hand column in Fig. 1 (Argyris, 1985).

If to be rigorous is to be scrupulously accurate, to permit no evasion or escape from the reality being studied, then the greater the gap between understanding and action, the less the rigor, even though the research is rigorously designed and executed.

The next step is to develop theories of action that are as testable, disconfirmable and generalizable as are normal science theories. These theories will ultimately contain propositions about understanding *and* about taking action which a practitioner can use to act *and* simultaneously to test the theory (Schön, 1983).

BIBLIOGRAPHY

Argyris, C., *Strategy, Change, and Defensive Routines* (Boston: Ballinger, 1985).

Argyris, C., Making Knowledge more Relevant to Practice: Maps for Action, in Lawler, E. E., *et al.* (eds), *Doing Research that is Useful for Theory and Practice* pp. 79–125 (San Francisco, CA: Jossey-Bass, 1985).

Argyris, C., *Inner Contradictions of Rigorous Research* (New York: Academic Press, 1980).

Argyris, C., Putnam, R., & Smith, D. M., *Action Science* (San Francisco, CA: Jossey-Bass, 1985).

Schön, D., *The Reflective Practitioner* (New York: Basic Books, 1983).